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UNITED STATES PATENT APPLICATION

of

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for

SENSOR SYSTEM WITH VARIABLE SENSOR-SIGNAL PROCESSING

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BACKGROUND OF THE INVENTION

The present invention relates to the field of sensor systems, and in particular to a technique for programming a sensor, such as a magnetic field sensor, for example a linear Hall effect sensor.

Conventional sensor systems are described, for example, in "Hütte - die Grundlagen der Ingenieurwissenschaften, Herausgeber: Akademischer Verein Hütte e.v., Berlin, edited by Horst Czichos, 30th newly revised and expanded edition, Berlin: Springer Verlag 1996, page H 18 ff" [Hütte - Basic Principles of the Engineering Sciences]. This publication discloses a sensor system that contains a sensor unit and an analytical unit. The sensor unit includes at least one sensor element that senses a measurement variable and generates a sensor signal representing this measurement variable. A sensor-signal processing unit then receives and processes the sensor signal. The function of the analytical unit is to analyze the sensor signals processed by the sensor processing unit.

There are a plurality of prior-art sensor types. These include, for example, four main types such as:

(i) sensors whose signals are processed in the sensor-signal processing unit in accordance with fixed algorithms (type 1); (ii) sensors whose signal processing in the sensor-signal processing unit can be freely programmed (type P); (iii) sensors whose signal processing is regulated (type R); and (iv) sensors whose signal processing in the sensor-signal processing unit can be both programmed and regulated. We shall now briefly describe these prior art sensor types:

Sensor systems with fixed signal processing algorithms

The most widespread sensor systems convert a generally analog physical or chemical measurement variable (M) into an output signal in accordance with fixed prescribed algorithms. Physical measurement variables can be, for example, pressure, temperature, and magnetic field. Chemical measurement variables can be, for example, the chemical reaction rate and the reaction enthalpy, or the like.

The sensor element typically converts the physical (or chemical) measurement variable (M) into an internal voltage signal U(M). However, it is also possible to generate a current signal or an optical signal that is indicative of the measurement variable M.

The sensors discussed hereinafter shall be discussed in the context of sensors that convert a physical measurement variable M into an internal voltage signal U(M). The amplitude of the internal voltage signal U(M) represents the physical measurement variable M. However, this assumption is made without any restriction of generality.

The output signal (Out) of most sensor units is proportional to the measurement variable M. However, especially in the case of magnetic field sensors, there are types which transform an analog measurement variable M into an output signal (Out) which has only two states. These are generally called switching sensors. Such switching sensor units have two fixed prescribed threshold values G_1 and G_2. In the following, we assume $G_1 > G_2$. In the output, these generate a signal Out = "1" if the internal voltage signal $U(M) > G_1$, and an output signal Out = "0" if $U(M) < G_2$: